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Reduction of Income Inequality in Sub-Saharan Africa: Which Fiscal Instrument Matters?

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Abstract

The existing literature is inconclusive on the relationship between fiscal instruments and income inequality. Many governments concerned with issues of income redistribution have paid attention to the way in which tax revenues are collected. In this study we shed new light on this issue by empirically investigating which between weight of tax revenues and tax structure used to collect revenues is more important in reducing income inequality in SSA. We use panel data on 34 Sub-Saharan Africa (SSA) countries over the period of 1992- 2014. Our model was inspired by the model developed by Martinez-Vazquez and al. (2012) and modified by Dao and Godbout (2014). We present both conventional fixed effect regressions and instrumental variable analyses, where fiscal instruments using the employment rate and the proportion of the working-age population as an instrument. The results reveal that the fiscal instrument tax revenues are count much more in reducing inequalities than the fiscal instrument used to collect revenues. The results are robust to different econometric specifications.

Keywords: Fiscal instruments, Income Inequality, SSA, instrumental variables

JEL: E2, H2, O.

1. Introduction

Fiscal instruments play a key role in reducing income inequality. According to IMF (2015) this experience has been observed in both developed and developing countries. For several decades, Sub-Saharan Africa (SSA) has experienced high- and growing-income inequality. Income inequality measured by the Gini Index increased from 43.8 between 2011-2015 on average to 44.3 in 2019. According to the United Nations Development Programme (UNDP) (2017), ten of the world's nineteen most unequal countries are in SSA. Moreover, according to the International Monetary Fund (IMF), the World Bank (WB) and the (UNDP), SSA is one of the most unequal regions in the world. To combat income inequality, numerous studies have highlighted the role of fiscal instrument (Stiglitz, 2012; Mooij and *al*. 2015; Saez, 2017, Alavuotunki and *al*. 2018; Cimenelli and *al*. 2019). For these authors, the mobilization of tax resources is recognized as one of the key factors in reducing income inequality. The role of fiscal instrument in reducing income inequality would be observed through public spending. By way of illustration, these studies indicate that the reduction of income inequality is achieved through the financing of social programs and global redistribution policies, as well as public investment in

infrastructure and human capital. Consequently, fiscal instruments can be a potent tool for archieving income inequality.

The empirical literature on relationship between fiscal instruments and income inequality has provided inconclusive evidence. The results differ depending on the choice of fiscal instrument. Two fiscal instruments are being debated upon. On one hand, some authors believe that the tax revenues collected are beneficial in reducing income inequality (Dao and Godbout, 2014; Martorano, 2018). According to these authors, tax revenues are used to finance policies to combat income inequality through the provision of public services such as health, education and transfers. Some other studies, on the other hand, agree that the tax structure, that is, how tax revenues are collected, is the only fiscal instrument that contributes in reducing income inequality (Martinez-Vazquez and *al*. 2012). Specifically, this work indicates that the introduction of progressive and indirect taxation are the key factors in the fight against income inequality.

This inconclusive literature between fiscal intruments and income inequality can also be seen in the stylized facts. This analysis of the state of fiscal instruments and income inequality in SSA allows to draw at least two lessons. The first is on the mobilization of tax revenues. Between 1990 and 2016, SSA recorded an increase in tax revenues of 4 points to 15% of GDP. This global statistics disguise disparities between countries. For example, oil-exporting countries achieved an average level of tax revenue of 27% between 1990 and 2016 compared to 18% for other countries in the same period. In fragile states, this mobilization was more difficult. In 2016, the latter recorded a level below 15% of GDP. Despite this improvement in the mobilization of tax revenues, it appears that it is still insufficient compared to other regions of the world. Indeed, two elements can better justify this insufficient level of tax revenue. Firstly, statistics show that tax revenues represent 19.1% of GDP in SSA compared to 22.8% and 34.3% respectively for Latin America and the Caribbean and OECD countries in 2016. Secondly, according to Jacquemot and Raffinot (2018), tax and para-fiscal revenues for the African continent in 2017 amounted to more than $310 billion, compared to the $50 billion provided by development partners, $70 billion in foreign direct investment and $65 billion in diaspora remittances. Although this performance of tax revenue mobilization is encouraging, they indicate following the work of Schmidt-Traub (2015), that this mobilization of tax revenues is still far from financing the financing needs related to the achievement of ODDs, whose needs amount to more than $1,000 billion per year, or a third of the gross national income of all African countries. The second lesson is the paradox that emerges between fiscal instruments and income inequality in SSA. Indeed, some countries, which have experienced high-income inequality, have a significant proportion of the growth rate of tax revenue mobilization. These include Comoros, Zambia and South Africa, which, despite high levels of income inequality, recorded an average tax revenue mobilization growth rate of 5%. However, other countries with high levels of income inequality have experienced low levels of tax revenue mobilization. For example, Namibia, Botswana or Seychelles have high-income inequality with an average increase of 2% in tax revenues.

A fundamental question emerges from recents developments : Which is the fiscal instrument between weight of tax revenues and tax structure that reduces income inequality in SSA? The purpose of this article is to identifiy which of the fiscal instrument reduces income inequality in SSA. The contribution of this article is on two levels. First, tackling inequality is one of the Sustainable Development Goals (Sdgs). As such, this article helps to provide practical solutions to fight income inequality in SSA through tax policy. Secondly, to the best of our knowledge, there are no studies that have highlighted the identification of fiscal instrument that reduces income inequality in the specific case of SSA. Our article contributes to the extension of the empirical literature. The paper proceeds as follows. Section 2 presents stylized facts of income inequality and fiscal instruments in SSA. Section 3 is devoted to the literature review. Section 4 introduces the methodological strategy. Section 5 reports and analyses main results. Section 6 concludes.

2.   Stylized Facts of Income Inequality and fiscal instruments in SSA

2.1 Income inequalities in SSA are high and differ from sub-region to sub-region

The stylised facts of income inequality in SSA provides two lessons. The first lesson shows that income inequality in SSA is high. Indeed, it appears that the Gini index of SSA is on average 44. The second teaching shows that the level of income inequality in SSA differs from one sub-region to another. For instance, it is apparent that the Southern Africa countries record the most important inequalities in SSA. Their Gini index is 50.17. This high level of income inequality in Southern Africa is mainly driven by countries such as South Africa, Namibia, Zambia and Botswana with a Gini coefficient of 63; 59.1; 57.1 and 53.3 respectively. In contrast, East Africa is the sub-region with the lowest level of income inequality with a Gini index of 40.02. For example, Ethiopia has a low level with a Gini index equivalent to 35. Summarily, world bank's statistic shows that SSA countries with the highest levels of inequality are in Central and Southern Africa. Their Gini index is above the SSA average of 43.74. In contrast, East and West African countries have relatively lower levels of inequality than the SSA average. These indices are 40.02 and 40.64 respectively. However, it is important to note that income inequality in SSA across all regions is high and persistent.

2.2 Fiscal performance are insufficient in SSA

Figure 1: Tax revenue as % of GDP in SSA
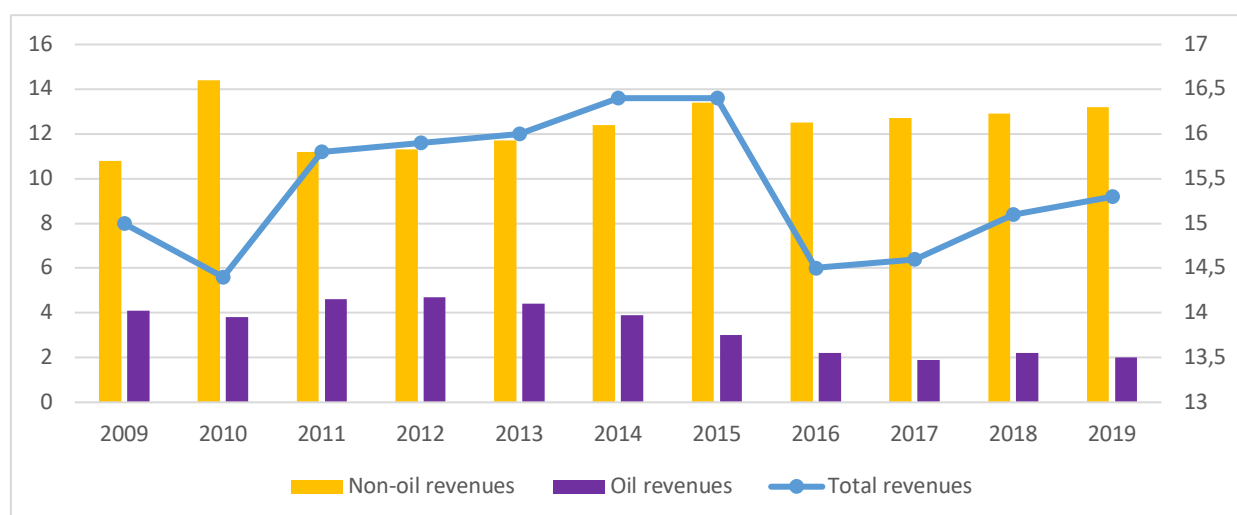
Sources: Author with IMF data (2018)

The main lesson drawn from Figure 1 is that, for several years now, SSA has achieved positive results in terms of raising tax revenues. For example, non-oil revenues rose from 10.8% of GDP in 2009 to 13.2% of GDP in 2019, an increase of 2.6 points. However, we note that the performance of oil revenues shows much lower levels of performance. This trend can be explained by the fall in oil prices in 2014. Overall, however, the total SSA tax revenues performed positively. They rose from 14.5% of GDP in 2016 to 15.3% in 2019, an increase of 0.8point. Even though the mobilization of tax revenues in SSA follows a positive trend, the level of mobilization of these revenues remains insufficient compared to other regions of the world, as we mentioned at the introduction. Thus, we can say that, SSA has experienced increasing levels of tax revenue mobilization in recent years. However, these performances differ depending on whether countries are fragile, low-income, middle-income or oil exporters.

2.3 The mobilization of tax revenues in SSA differs according to the level of income

Figure 2: Mobilization of tax revenues in SSA with respect to on the level of income (% of GDP)
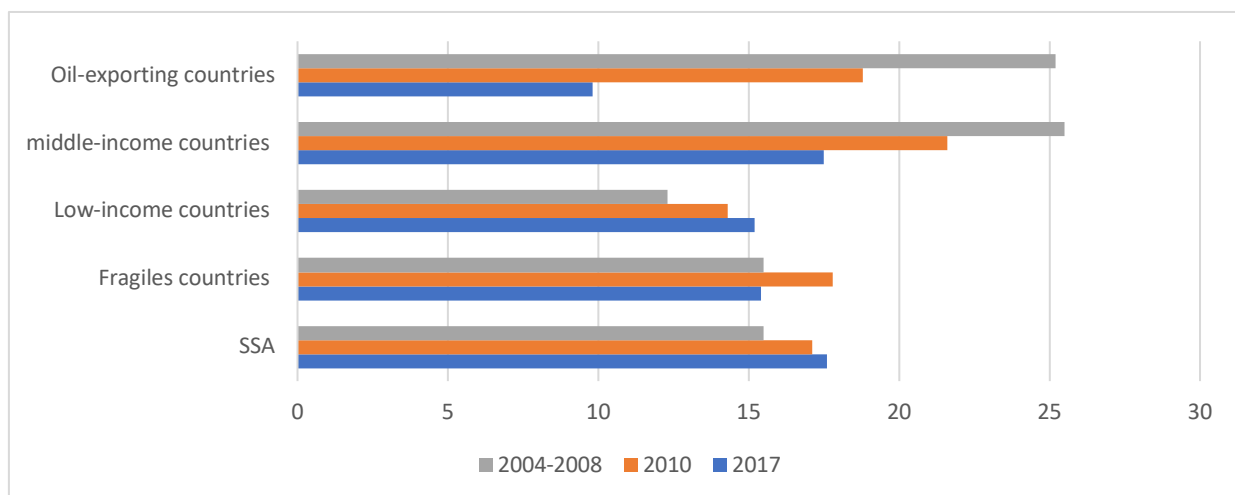
Sources: Author from Jacquemot and Raffinot (2018) and IMF (2018)

Figure 2 above shows the disparities in tax performance excluding grants in the SSA. Two lessons can be detected. The first is that, oil-exporting and middle-income countries show a decreasing trend in fiscal performance. This drop is more pronounced in oil-exporting countries, which fell from 18.8% of tax revenues in 2010 to 9.8% in 2017, a drop of 9 points. This poor performance is due to the fall in oil prices in 2014, which led to lower oil revenues. Fragile countries also experienced a fall in tax revenue mobilization. Secondly, low-income countries have recorded positive performances. According to Jacquemot and Raffinot (2018) these performances are linked to the major efforts to adapt to the tax systems undertaken by these countries. They point out that, in the past, burden-sharing focused on exports and imports, turnover and income of a small number of operators. The so-called first-generation tax transition that was initiated consisted for many countries to reduce the share of the taxation based on door duties to favour indirect taxation and especially VAT, of which the implementation has widely extended.

3. Literature Review

The theoretical and empirical work on the effect of fiscal instruments on income inequality is consensus that taxation is an instrument for combating income inequality. However, the results of the relationship between fiscal instruments and income inequality don't agree on the fiscal instrument likely to reduce income inequality.

At the theoretical level, the relationship between fiscal instruments and income inequality is based on the modern theory of optimal taxation developed by Mirrlees (1971). According to this theory, the primary distribution of income is likely to be changed by means of tax levies and transfers. In addition, confronted with the use of indirect taxation and direct taxation to combat income inequality, Mirrlees (1971) advocated the choice of direct taxation. According to Mirrlees (1971), the fight against income inequality should be achieved only with direct income tax because it guarantees a greater and necessary fiscal mobilization to execute the transfers. It shows the efficiency of production and the uniform imposition of basic products. It therefore refutes indirect taxation such as production subsidies, tariffs or differentiated taxation of basic products which it considers to be sub-optimal. However, the theoretical work of Saez (2004) relativized this approach by showing that the choice of direct taxation is not systematically effective in reducing income inequality. According to Saez (2004), direct taxation ceases to be relevant when labour taxation is based solely on income and when there is an imperfect substitution of the types of work in the production function. Hence, it suggests that the choice of the fiscal instrument should be based on objectives to be achieved in the short or long term. To this end, it recommends that, in the short term, the fight against income inequality should be carried out through indirect taxation. On the other hand, it suggests that direct taxation should be implemented in the long run to combat

income inequality. Stiglitz (2012) finds more mitigated results. He suggests that, to combat income inequality, progressive taxation should be introduced. This progressive taxation according to Stiglitz (2012) is illustrated by the transformation of corporate taxes so that they are more progressive and more impermeable.

Empirical literature on the relationship between fiscal instruments and income inequality is also inconclusive. There are two conflicting trends regarding the tax component that can reduce income inequality. According to the first trend, it is the tax structure (that is, the way tax revenues are collected) that leads to the reduction of income inequality. For example, the work of Martinez-Vazquez and *al.* (2012) attests that progressive personal income tax and corporate income tax reduce income inequality. They also note that general consumption taxes, excise duties and customs duties have a negative impact on the distribution of income. These results are consistent with the work of Bastagli and *al.* (2012) and Chu and *al.* (2004). Similarly, Woo and *al.* (2013) analysed the effect of taxation on income inequality on a sample made up of developed and emerging countries. They showed that the introduction of progressive taxation, introduced in the framework of a wider fall in expenditure, can help offset some of the unfavourable distributive impact of consolidation. And as a result, this progressive taxation leads to a decline in income inequality. The second trend is that tax revenues are much more important in reducing income inequality than the tax structure. In this vein, Dao and Godbout (2014), in a sample of OECD countries, point out that the level of tax revenue collected is more important than the tax structure that governments use to collect it. They also add that collecting more tax revenues allows governments to provide more public services and transfers to their citizens. The work of Martorano (2018) also went in the same direction. Indeed, it has shown that the effect of the tax structure on income inequality is limited; therefore, it suggests more mobilization of tax revenues to reduce income inequality.

4. Methodology Strategy

4.1 Empirical Model

Equation (1), which models the relationship between fiscal instruments and income inequality is based on the model developed by Martinez-Vazquez and *al.* (2012) and modified by Dao and Godbout (2014).

$$\text{Gini}^{net} = \alpha\text{Gini}_{it}^{market} + \beta X_{it} + \gamma F_{it} + \delta_i + \varepsilon_{it} \ (1)$$
Pour i =1, …37 et t= 1992…2014.

Where Gini ^{net} is the dependent variable that captures income inequality after taxes and transfers. According to Dao and Godbout (2014), the choice of this variable is related to the fact that it measures the ability of taxation to reduce income inequality. The explanatory variables are as follows: (i) the Gini market taxes and transfers, (ii) the vector of the control variables (X), which is made up of six variables. The first variable is per capita income (Gdp) measured by GDP per capita. This variable is used in accordance with Kuznets' theory, which shows that the reduction of income inequality depends on the increase in household incomes. The second variable represents natural resources (NRs); this variable is captured by the ratio of the rent of natural resources to GDP. Indeed, Buccellato and Alessandrini (2009) show that dependence on natural resources increases income inequality. However, Fum and Hodler (2010) questioned this result by demonstrating that natural resources widen income inequalities in ethnically polarized societies but reduce them in ethnically homogeneous societies. The third variable is trade openness (Open) which is measured by the ratio of the sum of exports and imports to GDP. According to the international trade theory, trade openness has a positive effect on income inequality. In other words, commercial openness through specialization increases the level of productivity, which in fine reduces income inequality. While François and Nelson (2003) find that open trade leads to reduced income inequality, Mahesh (2016) shows that open trade accentuates income inequality. The fourth variable is inflation as measured by the Consumer Price Index (Cpi). For Easterly and Fischer (2001), income inequality is negatively affected by inflation in the sense that, rising prices induce a reduction in household purchasing power. Also, the work of Erosa and Ventura (2002) and Albanesi (2007) cited by Doumbia and Kinda (2019) indicates that inflation tends to aggravate income inequality through various channels. The fifth variable is credit to the private sector (CPS), which according to Claessens and Perotti (2007) plays an important role in reducing income inequality. In addition, the works of Galor and Zeira (1993) and Corak (2013) have shown that the

ability of modest households to invest in physical capital or education is reduced in a context of the imperfection of the credit market, where only the wealthiest have access to credit unlike the poor; which tends to accentuate income inequality. The sixth variable represents public expenditure (Expen) measured by the ratio of total expenditure as a percentage of GDP. Some work has shown that high public spending is associated with lower income inequality (Fournier and Johansson 2016; Doumbia and Kinda, 2019). (iii) the variable that captures taxation (F). We use four measures to capture taxation: tax revenues as a percentage of GDP (tax revenues), the ratio of income taxes to total revenues (imp), direct taxes and indirect taxes.

4.2 Estimation technique and data presentation

The estimation technique used in this study is the Fixed Effect Ordinary Least Squares method. The choice of this method is based on the simplicity and advantages it has. On one hand, this method corrects the biases caused by the autocorrelation of errors and heteroscedasticity. Finally, this method takes heterogeneity into account in a simple way and makes it possible to test the uniformity of behaviours. The robustness of our results is developed by the Two stage least squares with Instrumental Variables method. The choice of this technique is justified insofar as we suspect an endogeneity between certain variables. For example, as demonstrated by Dao and Godbout (2014), there may exist an endogeneity between fiscal instruments and income inequality. In fact, they show that a government could have to change its tax structure precisely because of pre-existing income inequality before taxes. In this respect, the method using instrumental variables can solve the problem of endogeneity.

Our study covers the period 1992 to 2014 on a sample of 34 SSA countries. For data sources, the Gini index is extracted from the World Income Inequality Database (WIID) and World Development Indicators (WDI) of the World Bank. Tax variables and control variables come from the World Bank's World Development Indicators database.

5.   Presentation and analysis of results

In this section, we analyse the effect of taxation on income inequality in SSA. Table 1 presents the results of the standard fixed effect least squares estimate. We selected four tax variables: total income from taxes (tax weight or volume) (model 1), the ratio of taxes to total revenues (model 2) which measures the relative distribution of tax categories by the ratio of one category to another, direct taxes (model 3) and indirect taxes (model 4).

Table 1: Estimation of the effect of fiscal instruments on income inequality in SSA using the fixed-effect Ordinary Least Square method

	Tax Weight	Taxes to total revenues	Direct taxes	Indirect Taxes	All fiscal variables
NRs	-0. 01***	-0.002	-0. 009***	-0.009***	-0.001
	(0.01)	(0.11)	(0.001)	(0.007)	(0.25)
CPI	-0. 06***	-0.005	-0. 009***	-0.01	0.0003
	(0.00)	(0.43)	(0.00)	(0.00)	(0.69)
Open	0. 004**	0.007***	0.005**	0.005**	0.002***
	(0.00)	(0.002)	(0.02)	(0.02)	(0.003)
CPS	0. 001	0.007***	0. 005*	0.002	0.007***
	(0.25)	(0.02)	(0.055)	(0.27)	(0.00)
GDP	0. 003	0.005	0. 02	0.01	0. 003
	(0.27)	(0.24)	(0.11)	(0.11)	(0.26)
Expen	-0.001	-0.0003	-0. 0009	-0.0008	-0.0002
	(0.17)	(0.44)	(0. 44)	(0.36)	(0.40)
Gini	0. 4	0.82***	0.65***	0.31***	0.31***
	(0.18)	(0.01)	(0.00)	(0.00)	(0.00)

Taxe revenues	-0.0013***	-0.0011**	-0.0011**	-0.0014**	-0.00012*
	(0.01)	(0.04)	(0.03)	(0.05)	(0.05)
Imp		0.001			0.001
		(0.33)			(0.32)
Direct taxes				0.003***	0.0002
				(0.00)	(0.1)
Indirect taxes				0.001***	0.00009
				(0.00)	(0.24)
R^2 ajusted	0.80	0.79	0.81	0. 81	0. 81

Note: The values in bracket represent P-values. (***), (**), (*) give significance at the respective threshold of 1%; 5% and 10%.

The empirical estimation on Table 1 reveals two main results; firstly, it emerges that, the tax volume or tax weight (tax revenue as a percentage of GDP) is the only tax indicator that reduces income inequality in SSA. In other words, the increase in tax volume leads significantly to a decrease in income inequality in SSA. This result is consistent with literature since the fight against income inequality is achieved through the provision of public services, transfers and public infrastructure. The implementation of these services depends on public spending. These expenditures, among other things, find their source in the mobilization of tax revenues. Thus, tax volume is more important in reducing income inequality in SSA. Secondly, direct and indirect taxes do not seem to be instruments for combating income inequality in SSA. This result corroborates the work of Martinez-Vasquez and *al*. (2012) which demonstrated that the tax structure is less effective against income inequality. To verify the relevance of our results, we introduced in the same regression all tax variables (model 5). Our analysis confirm that tax volume is the only tax variable to a negative and significant sign. In other words, the tax volume is the only tax variable that contributes in reducing income inequality, unlike the variables related to the tax structure in SSA. Both results are consistent with the work of Dao and Godbout (2014), who found that the weight of tax revenues in an economy is much more important in reducing income inequality than the characteristics of the tax structure used to collect them.

Concerning the control variables, trade openness, credit to the private sector and gross domestic product per capita have a positive effect on income inequality in SSA; in other words, they contribute to widening the income gap between households. These results are significant and consistent with several empirical studies. For instance, Mahesh (2016) found that an increase in trade as percentage of GDP has in fact resulted in the worsening of the income distribution in concerned countries. This result is predictable as imports do not promote employment opportunities but constitute a large consumption market. Similarly, this result reflects the fact that even the expansion of exports is not enough to reduce income inequality as these exports require advanced technology and adequate infrastructure. With respect to credit to the private sector, the positive result reflects the idea that the loans granted are directed towards a minority of wealthy households, eligible for these credits. In other words, access to credit would be conditioned by a certain level of income and regulatory requirement, of which only the wealthiest can provide. Regarding gross domestic product per capita, our results show that economic growth is not consistently associated with lower income inequality. This finding corroborates the work of Piketty (2015) and Stiglitz (2015) who challenged Kuznets's (1955) theory that economic growth reduces income inequality. When it comes to natural resources, our results show that natural resources contribute in reducing income inequality in SSA. This result contrasts those of Buccellato and Alessandrini (2009). It is explained by the fact that by generating significant resources, natural resources give States the opportunity to provide public goods and services that eventually contribute to the reduction of inequalities.

Robustness analysis were conducted to address a potential endogeneity bias between taxation and income inequality. Indeed, a high level of income inequality encourages the public authorities to increase the mobilization of tax revenues. Thus, permitting all things being equal, transfers to vulnerable strata. Similarly, for public authorities to make an investment decision in sectors likely to reduce income inequality, they will consider the previous levels of these inequalities. The use of the Two-stage least squares technique involves the choice of instruments. The choice of instruments is inspired by the work of Dao and Godbout (2014). For

example, we use two demographic indicators: the employment rate and the proportion of the working-age population. This choice is motivated by the fact that tax revenues are collected, among other things, from taxes on income and wages. Note that the higher the employment rate, the higher the revenues. Likewise, a large labour force is a potential source of substantial tax revenue mobilization. The computing of the correlation coefficients between the tax volume (the tax variable most likely to suffer from an endogeneity bias) and the employment rate on one hand and the working-age population on the other hand gives values of 0.71 and 0.53 respectively. The results of this robustness analysis (Table 2) is in line with those of our baseline analysis

Table 2: Estimation of the effect of fiscal instruments on income inequality in SSA by the Two Stage Least Square method

	Tax Weight	Taxes to total revenues	Direct taxes	Indirect Taxes	All fiscal variables
NRs	-0. 03***	-0.003	-0. 02***	-0.02***	-0.003
	(0.00)	(0.21)	(0.001)	(0.007)	(0.25)
CPI	-0. 01***	-0.004	-0. 02***	-0.02	0.0005
	(0.00)	(0.73)	(0.00)	(0.00)	(0.69)
Open	0. 008**	0.003***	0.007**	0.008**	0.003***
	(0.02)	(0.003)	(0.02)	(0.02)	(0.003)
CPS	0. 003	0.01***	0. 009*	0.005	0.01***
	(0.45)	(0.00)	(0.055)	(0.27)	(0.00)
GDP	0. 02	0.008	0. 03	0.03	0. 008
	(0.18)	(0.26)	(0.11)	(0.11)	(0.26)
Expen	-0.002	-0.0005	-0. 001	-0.002	-0.0005
	(0.27)	(0.44)	(0. 44)	(0.36)	(0.40)
Gini	0. 8	0.92***	0.82***	0.82***	0.92***
	(0.18)	(0.00)	(0.00)	(0.00)	(0.00)
Tax revenues	-0.0015***	-0.0013	-0.0013**	-0.0018**	-0.0011*
	(0.00)	(0.37)	(0.03)	(0.05)	(0.08)
Imp		0.002			0.002
		(0.41)			(0.32)
Direct taxes			0.005***		0.0005
			(0.00)		(0.21)
Indirect taxes				0.002***	0.0002
				(0.00)	(0.45)
Sargan test	0.089	0.77	0.098	0.098	0.098
P-Value	0.76	0.37	0.75	0.7548	0.7548
Basmann test	0.087	0.73	0.095	0.095	0.095
P-value	0.76	0.39	0.75	0.7577	0.7577
R^2	0.91	0.90	0.9197	0. 9162	0. 9162
R^2 ajusted	0.90	0.89	0.9181	0. 9145	0. 9145

Note: The values in brackets represent students. (***), (**), (*) give significance at the respective threshold of 1%; 5% and 10%.
The results on this table use the employment rate and the proportion of working age the population as instruments of tax volume.

6. Conclusion

In this paper we use fixed effect Ordinary Least Square and instrumental variables to estimate the effect of fiscal instruments on income inequality in SSA. We use panel data on 34 Sub-Saharan Africa (SSA) countries over the period of 1992- 2014. The results suggest that the fiscal instrument tax revenues is count much more in reducing inequalities than the fiscal instrument used to collect revenues. This result is consistent and in line with literature and confirms that although all fiscal instruments don't reduce income inequality one of them particularly tax

revenues are a tool to achieve income inequality in SSA. The paper suggests three recommandations. Firstly, the paper calls on the authorities of the SSA countries as well as non-State institutions to strengthen the mobilization of tax revenues. Secondly, the paper calls on the authorities to review the nominal tax rates and promote the expansion of the tax base. And Thirdly, the paper invites public authorities to put in more efforts in improving the business climate in order to attract more foreign direct investment.

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